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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,549	05/18/2005	Kazutomo Hasegawa	33857-00011USPX	7266

61060 7590 08/20/2008

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EXAMINER	
NEFF, MICHAEL R	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
08/20/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/535,549	HASEGAWA, KAZUTOMO	
	Examiner	Art Unit	
	MICHAEL R. NEFF	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5,7,8 and 10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5,7,8 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/20/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments see pages 6 and 7 of remarks, filed 5/7/2008, with respect to the rejection(s) of claim(s) 5 and 7 under Bremer, Jasper, and Choul have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Zhang, Barabash and Jasper.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (US Patent 6,141,387) in view of Bremer (US Patent 4, 464, 767; see IDS), Barabash et al. (herein after Barabash) (US Patent 5,640,417) and Jasper (US Patent 5,343,499).

Re Claim 5, Zhang discloses a multiplexing QAM modulation system (Figure 2, elements 49, 45, and 47; Col. 3 lines 1-8; element 107); the disclosure of which would render obvious to one of ordinary skill in the art the appropriate multiplexing QAM demodulation unit. The disclosure of Zhang fails however to render obvious wherein (1) the input data is differential-gain- multiplexed input data; and further (2) a probability calculating unit adapted to calculate probabilities of the that said reception signal corresponding to respective symbol positions based on variance of symbol positions

caused by a transmission line; an expectation value calculating unit adapted to calculate an expectation value of each of the plurality of differential-gain-multiplexed input data based on the calculated probabilities; a demodulation unit adapted to estimate a multiplexed input data based on an expectation value of said multiplexed input data; and (3) wherein said demodulation unit is adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing and then estimate remaining input data while eliminating improbable symbol positions from the estimated multiplexed input data.

Regarding item (1) above; Bremer discloses a QAM system wherein the QAM modulated waves combining unit gives a gain difference to said plurality of QAM-modulated waves to be combined together, so that symbol positions of said multiplexed QAM-modulated wave combined do not coincide with each other (32, 34, 36; Col. 2 lines 21-33; Figure 4).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the signal weighting/gain adjusting aspect of the QAM multiplexing system disclosure of Bremer within the disclosure of Zhang in order to gain the benefit of further enhancing the performance of the QAM system through utilizing the predictable result of the signal weighting to avoid signal overlay and allow for a greater transmission rate.

Regarding item (2) above; Barabash discloses a probability calculating unit adapted to calculate probabilities of the that said reception signal corresponding to respective symbol positions (Abstract; Figures 3 and 4; Col. 6 line 65-Col. 7 line 44)

based on variance of symbol positions caused by a transmission line (Abstract; Figures 3 and 4; Col. 6 line 65-Col. 7 line 44); an expectation value calculating unit adapted to calculate an expectation value of each of the plurality of differential-gain-multiplexed input data based on the calculated probabilities (Abstract; Figures 3 and 4; Col. 6 line 65-Col. 7 line 44); and a demodulation unit adapted to estimate a multiplexed input data based on an expectation value of said multiplexed input data (Figure 7; Col. 8 lines 12-34; Col. 9 lines 13-53).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the QAM signal detection process through the means of symbol probability and expected symbol values as disclosed by Barabash within the QAM modulator/demodulator disclosure of Zhang in order to gain the benefit of reducing symbol detection error through probability calculations and the use of expected value calculations based on the probabilities.

Regarding item (3) above Jasper discloses wherein said demodulation unit is adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing (Col. 7 lines 27-49) and then estimate remaining input data (66, 69) while eliminating improbable symbol positions from the estimated multiplexed input data (67; Col. 6 lines 46-56).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosure of Jasper as being an obvious design for a demodulation unit to coincide with the modulation system of Zhang in order to gain the benefit of increasing the system efficiency and accuracy by providing further

detailed information for use in the symbol location estimation of the demodulation process, allowing the differential-gain signals to be estimated based on the location of the symbols with the best reception strength and quality.

Re Claim 7, Zhang discloses a multiplexing QAM modulation system (Figure 2, elements 49, 45, and 47; Col. 3 lines 1-8; element 107); the disclosure of which would render obvious to one of ordinary skill in the art the appropriate multiplexing QAM demodulation unit. The disclosure of Zhang fails however to render obvious wherein (1) the input data is differential-gain- multiplexed input data; and further (2) a judgment unit adapted to estimate individual symbol positions which appear in a received multiplexed QAM-modulated wave based on both a symbol position arrangement of said multiplexed QAM-modulated wave and a characteristic of a transmission line; wherein the judgment unit is adapted to determine a most probable symbol position based on distances between the estimated individual symbol positions and a symbol position of said reception signal; wherein the judgment unit is adapted to determine plurality of input data from the determined most probable symbol position; and (3) a demodulation unit adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing and then estimate remaining input data while eliminating improbable symbol positions from the estimated multiplexed input data.

Regarding item (1) above; Bremer discloses a QAM system wherein the QAM modulated waves combining unit gives a gain difference to said plurality of QAM-

modulated waves to be combined together, so that symbol positions of said multiplexed QAM-modulated wave combined do not coincide with each other (32, 34, 36; Col. 2 lines 21-33; Figure 4).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the signal weighting/gain adjusting aspect of the QAM multiplexing system disclosure of Bremer within the disclosure of Zhang in order to gain the benefit of further enhancing the performance of the QAM system through utilizing the predictable result of the signal weighting to avoid signal overlay and allow for a greater transmission rate.

Regarding item (2) above; Barabash discloses a judgment unit adapted to estimate individual symbol positions which appear in a received multiplexed QAM-modulated wave based on both a symbol position arrangement of said multiplexed QAM-modulated wave and a characteristic of a transmission line (Abstract; Figures 3 and 4; Col. 6 line 65-Col. 7 line 44); wherein the judgment unit is adapted to determine a most probable symbol position based on distances between the estimated individual symbol positions and a symbol position of said reception signal (Abstract; Figures 3 and 4; Col. 6 line 65-Col. 7 line 44); wherein the judgment unit is adapted to determine plurality of input data from the determined most probable symbol position(Figure 7; Col. 8 lines 12-34; Col. 9 lines 13-53).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the QAM signal detection process through the means of symbol probability and expected symbol values as disclosed by Barabash

within the QAM modulator/demodulator disclosure of Zhang in order to gain the benefit of reducing symbol detection error through judgment processing utilizing probability calculations and the use of expected value calculations based on the probabilities. Regarding item (3) above Jasper discloses wherein said demodulation unit is adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing (Col. 7 lines 27-49) and then estimate remaining input data (66, 69) while eliminating improbable symbol positions from the estimated multiplexed input data (67; Col. 6 lines 46-56).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosure of Jasper as being an obvious design for a demodulation unit to coincide with the modulation system of Zhang in order to gain the benefit of increasing the system efficiency and accuracy by providing further detailed information for use in the symbol location estimation of the demodulation process, allowing the differential-gain signals to be estimated based on the location of the symbols with the best reception strength and quality.

4. **Claim 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, Bremer, Barabash and Jasper as applied to claims 5 and 7 above, and further in view of Trans et al. (herein after Trans) (US Publication 2003/0016770 A1).**

Re Claim 8 and10 the combined disclosures or Zhang, Bremer, Barabash and Jasper as a whole disclose the multiplexing QAM demodulation apparatus according to

claims 5 and 7; the combined disclosure, specifically that of Bremer discloses the use of training sequences in the QAM signal processing; but fail however to explicitly disclose wherein the apparatus further comprising: a training unit that receives a prescribed training signal transmitted from said apparatus during an initialization period of signal transmission; wherein the training unit is adapted to determine, based on said training signal and by operating with said apparatus, at least one parameter among: a QAM value of respective QAM-modulated waves to be differential-gain- multiplexed into said multiplexed QAM-modulated wave;

a gain difference between said QAM-modulated waves; and

a phase difference between said QAM-modulated waves, so that a proper inter- symbol distance of said multiplexed QAM-modulated wave can be secured after the reception.

This design is however discloses by Trans. Trans discloses a training unit that receives a prescribed training signal transmitted from said apparatus during an initialization period of signal transmission (Paragraph 0383, 0489); wherein the training unit is adapted to determine, based on said training signal and by operating with said apparatus, at least one parameter among (0646, 0659): a QAM value of respective QAM-modulated waves to be differential-gain- multiplexed into said multiplexed QAM-modulated wave (0646, 0659);

a gain difference between said QAM-modulated waves; and

a phase difference between said QAM-modulated waves (0646, 0659), so that a proper inter- symbol distance of said multiplexed QAM-modulated wave can be secured after the reception (0659).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the training sequence initialization and processing means as disclosed by Trans in order to pass more information to the QAM demodulator as disclosed by the combined disclosures or Zhang, Bremer, Barabash and Jasper as a whole in order to gain the added benefit of reducing the errors made in the QAM signal processing by providing training information based on the QAM signals characteristics.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL R. NEFF whose telephone number is (571)270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL R. NEFF/

Examiner, Art Unit 2611

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611